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## Regional growth policy in Denmark – an assessment of the role of innovation as an instrument in regional policy

### Abstract:

A recent study for the Danish government has identified innovation as one of the major drivers of regional competitiveness in Denmark. Innovation and the capacity to innovate are crucial factors in the development of a firm and its ability to adapt to changes in the external environment. In particular changes in the international production system with increasing out-sourcing of physical production from Western Europe has highlighted the need for an alternative economic base in many regions.

As a consequence, attention has been on the role of innovation policy in economic policy in general and regional development in particular. The aim of this paper is to analyze the interaction between the actors in the innovative environment (i.e. the firm, advisory and research institution) and the external environment as a part of a broader network of innovative relations covering intra-firm as well as extra-firm relations and processes.

The project covers the following aspects:

- In the first part of the paper concepts and policies of innovation are discussed with regard to their ability to move the economy toward higher growth.
- The second section provides a brief overview of regional convergence and disparities in Denmark in the last decade, and compares with the trends in a broader European perspective.
- The next section summarizes the findings of a recent study of the regional system of innovation in Western Denmark, and provides a critical review of the role of innovation in the process of economic restructuring in the perspective of growing internationalization in many branches.

Based on this assessment the future perspectives of regional policy in Denmark are discussed on the background of the ongoing reorganization of local and regional government in general, and the introduction of five regional growth-forums in particular.

*Key words:* Regional system of innovation – convergence and disparities – growth policies – regional policy – regional organizational restructuring

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## 1. Introduction

A recent study for the Danish government has identified innovation as one of the major drivers of regional competitiveness in Denmark. Innovation and the capacity to innovate are crucial factors in the development of a firm and its ability to adapt to changes in the external environment. In particular changes in the international production system with increasing out-sourcing of physical production from Western Europe has highlighted the need for an alternative economic base in many regions.

As a consequence, attention has been on the role of innovation policy in economic policy in general and regional development in particular. The aim of this paper is to analyze the regional development with regard to economic growth and the development of regional disparities. Furthermore the interaction between the actors in the innovative environment (i.e. the firm, advisory and research institution) and the external environment as a part of a broader network of innovative relations covering intra-firm as well as extra-firm relations and processes will be addressed empirical as well as conceptual.

## 2. Concepts of policies for innovation<sup>1</sup>

Traditional economic growth models have their focus on capital and labor as growth drivers. Nowadays concepts of growth and new growth models are operating with a wider range of growth drivers including factors like human capital, knowledge and innovation and even intangible factors like entrepreneurial spirit (Audresch, 2006). The overall idea is to use concepts and policies of innovation as an instrument to stimulate the economy to move toward higher level of growth.

Innovations and the capacity to innovate are important for regional development<sup>2</sup>. Regional growth is not an exogenous or independent phenomenon, but more or less ‘derived’ from the ability of the local business and industry to perform and generate income. In particular on the ability to adapt to changes in the external environment is crucial. For this reason, attention has been paid to the factors facilitating growth and the mechanisms stimulating innovation in large, small and medium-sized enterprises. In this perspective, the role of knowledge and innovation is at least twofold.

In the short run, innovation and knowledge creation becomes necessary instruments in the process of regional adaptation to industrial change as a response to changes in the competitive environment.

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<sup>1</sup>. This section is a summary of a paper prepared for the Tinbergen Institute, International Workshop on Creativity and Smart Policy as a Signpost for Innovative Development 29 & 30 May 2006, Amsterdam, (Cornett 2006).

<sup>2</sup>. In this project innovation has to be seen as both independent variable (i.e. a growth driver as shown in Figure 1), and as a dependent variable with regard to policies to stimulate innovative behaviour in the firm or educational sector.

In a longer perspective, innovation and knowledge are preconditions for a successful restructuring of the economic base, national as well as regional and local. As a consequence, attention has been on the role of innovation policy in economic policy in general (i.e. OECD 2001) and regional development in particular (see Acs & Varga 2002a). A more recent Danish example is a governmental report entitled 'The competitiveness of regions', in which innovation is considered one of the drivers behind regional economic growth<sup>3</sup> (Copenhagen Economics 2004).

To a large extent the process of adaptation to external changes and the ability to prepare for more fundamental alterations of the regional economic base depends on the existing regional resource-base. Therefore it is important to formulate and implement strategies for local policies. In this process the analysis of the linkages between businesses, the knowledge sector and public sector seems to be of central importance, both from an institutional perspective and as a possible dynamic force in the above mentioned restructuring and adaptation processes<sup>4</sup>.

Furthermore it is study stresses the importance of education, entrepreneurship, innovation, human capital, and the overall framework conditions provided by the public sector like macroeconomic stability, openness and competition and a working social and economic system. The above quoted statements from the OECD studies are well in line with concepts stressing that growth nowadays has to be seen as a non-linear process only partly depending on the simple amount of inputs, but heavily depending on soft factors, like creativity or new modes of production or new products.

In this non-linear approach to economic growth innovation has become one of the crucial growth-drivers, at least in a public policy perspective. Also on the regional level much attention has been on the nature of innovation, on the conceptual frameworks of the systems of innovation, and on the most appropriate policy set up. A central part of the latter is the business advisory systems, since they are pivotal with regard to the transformation of innovations from the knowledge sector into innovative activities within the firms, in particular with special attention to small and medium sized enterprises. The focal point is the interaction between the analyzed business entity and the external environment as a part of a broader network of innovative relations covering intra-firm as well as

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<sup>3</sup>. This is in line with the regional growth strategies launched in the last couple of years in Denmark; see Ministry of Economic and Business 2003.

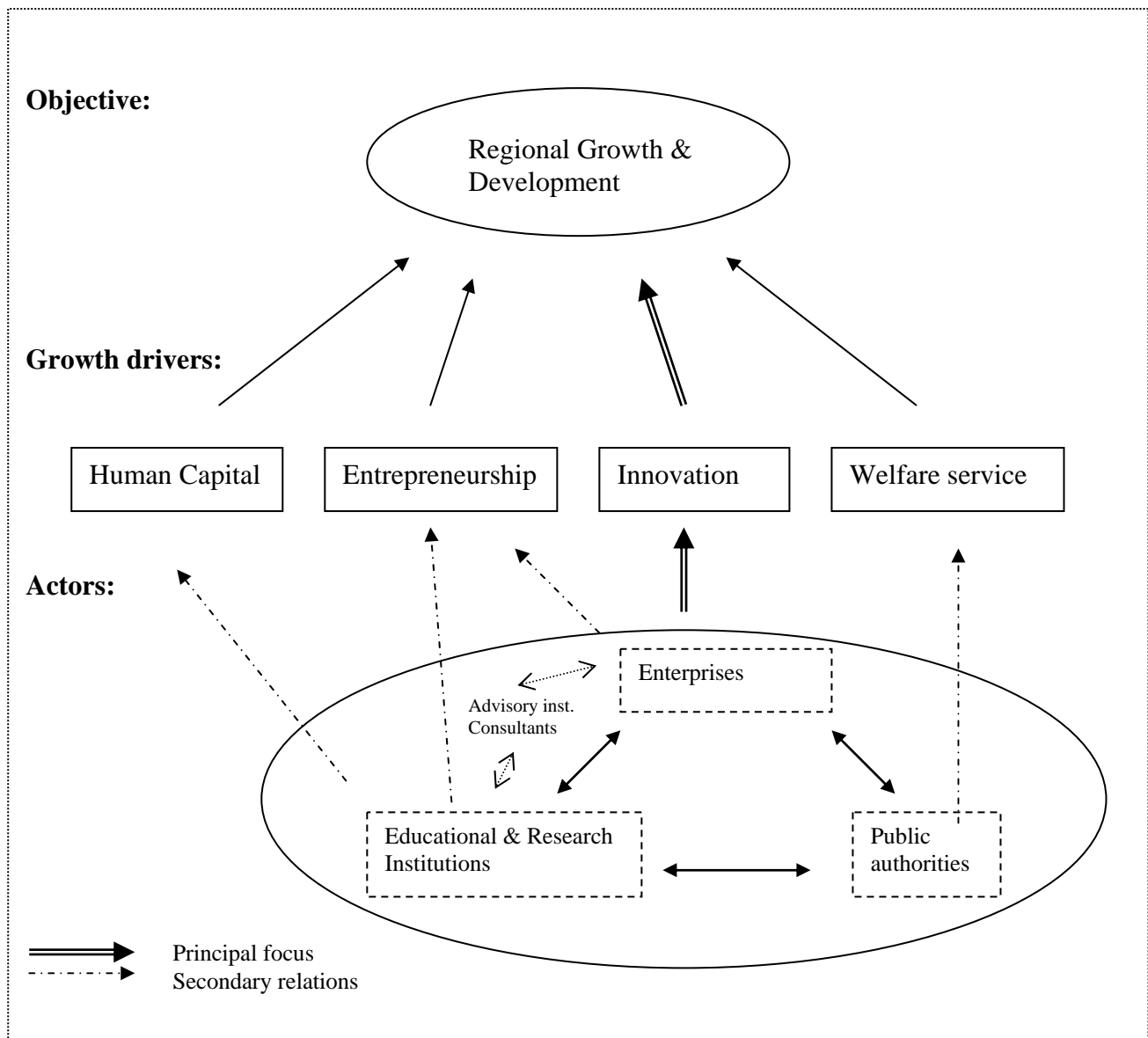
<sup>4</sup>. According to the OECD 2001, the best performing countries with regard to economic growth did this for several reasons:

"... those OECD countries that registered increased growth in GDP per capita in the 1990's did so by having generally drawn more people into employment, accumulating more capital, in particular ICT, and improving the average quality of their work force. In many cases, they have also improved MFP[multi-factor productivity]. Some of these factors are well established as drivers of growth; others have received a new emphasis in recent years. In several countries with strong growth in the 1990's, ICT investment has been important. This led to rapid diffusion of ICT, which has also affected overall efficiency. Innovation and technology diffusion are also important, as a possible way to higher MFP and to future technological breakthroughs."(OECD 2001, p.24)

extra-firm relations and processes, see Section 3 below.

Innovation and the dissemination of knowledge have not only become an important building block in academic studies of regional development, but also in more policy oriented investigations of the factors behind regional development or the lack of development. Regional systems of innovation are an integrated part of the concepts of national systems of innovation (see Acs & Zarga 2002a& b).

**Figure 1** A regional growth model



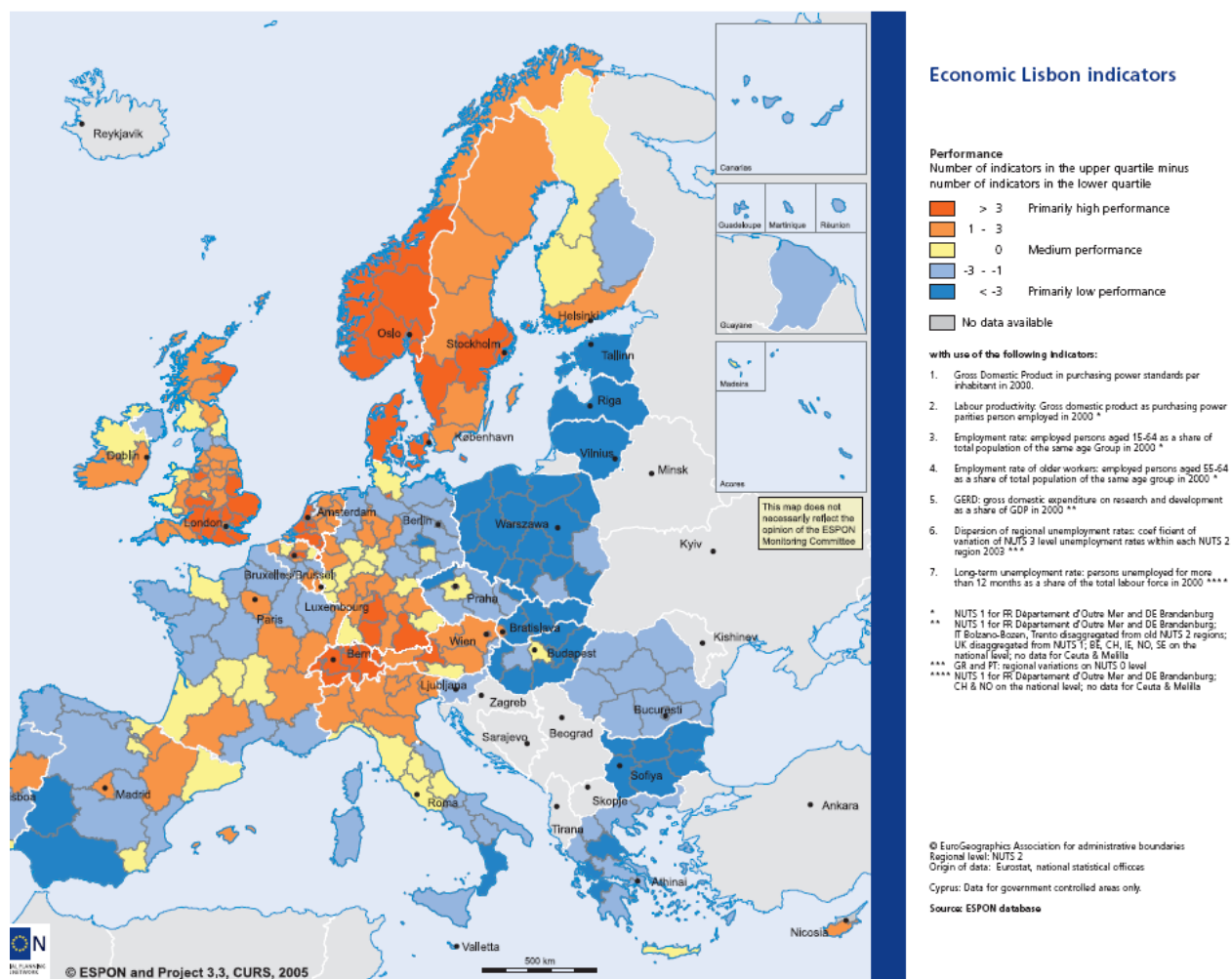
**Note:** The growth driver "Welfare service" has in recent applications of the concept been replaced by the original 'Technology-driver'. In the concept applied in this paper the technological aspects are embedded in 'Innovation' and partly 'human capital'

**Source:** Modified figure based on The Ministry of the Interior and Health 2004, p. 28, and Etzkowitz & Leydesdorff 2000.

A Danish example is a report on regional competitiveness focusing on different parts of Denmark,

not necessarily identical with the current administrative regions, the counties or the new regions<sup>5</sup> (Copenhagen Economics 2004, p.23). The political importance of this strategy is stressed in the recent Danish White paper on regional policy (The Ministry of the Interior and Health, 2004) that says that innovation is one of four drivers in a regional growth policy; see the upper part of Figure 1.

**Figure 2** Lisbon indicators



**Source:** ESPON ([www.espon.lu](http://www.espon.lu))

The drivers mentioned in the model sketched in Figure 1 have all a high priority in the official Danish business promotion policy, and a number of specific programs have been launched<sup>6</sup>. The main concern related to the drivers is that the impacts on growth performance are hard to measure, and that the operationalization of the instruments in practice can be difficult. Furthermore the picture becomes complicated through the different levels of policy at work, both internal in a

<sup>5</sup>. See Annex for a map of the new Danish regions from January 1 2007.

<sup>6</sup>. For details see Cornett 2006 and Ministry of Economics and Business 2004.

country and with regard to EU programs and strategies<sup>7</sup>. As it can be seen from the illustration in Figure 2 below, Denmark has a reasonable performance in according to the used indicators.

An analysis of Denmark reveals significant differences with regard to competitiveness (Copenhagen Economics 2004) and regional disparities within the country see Section 2 below.

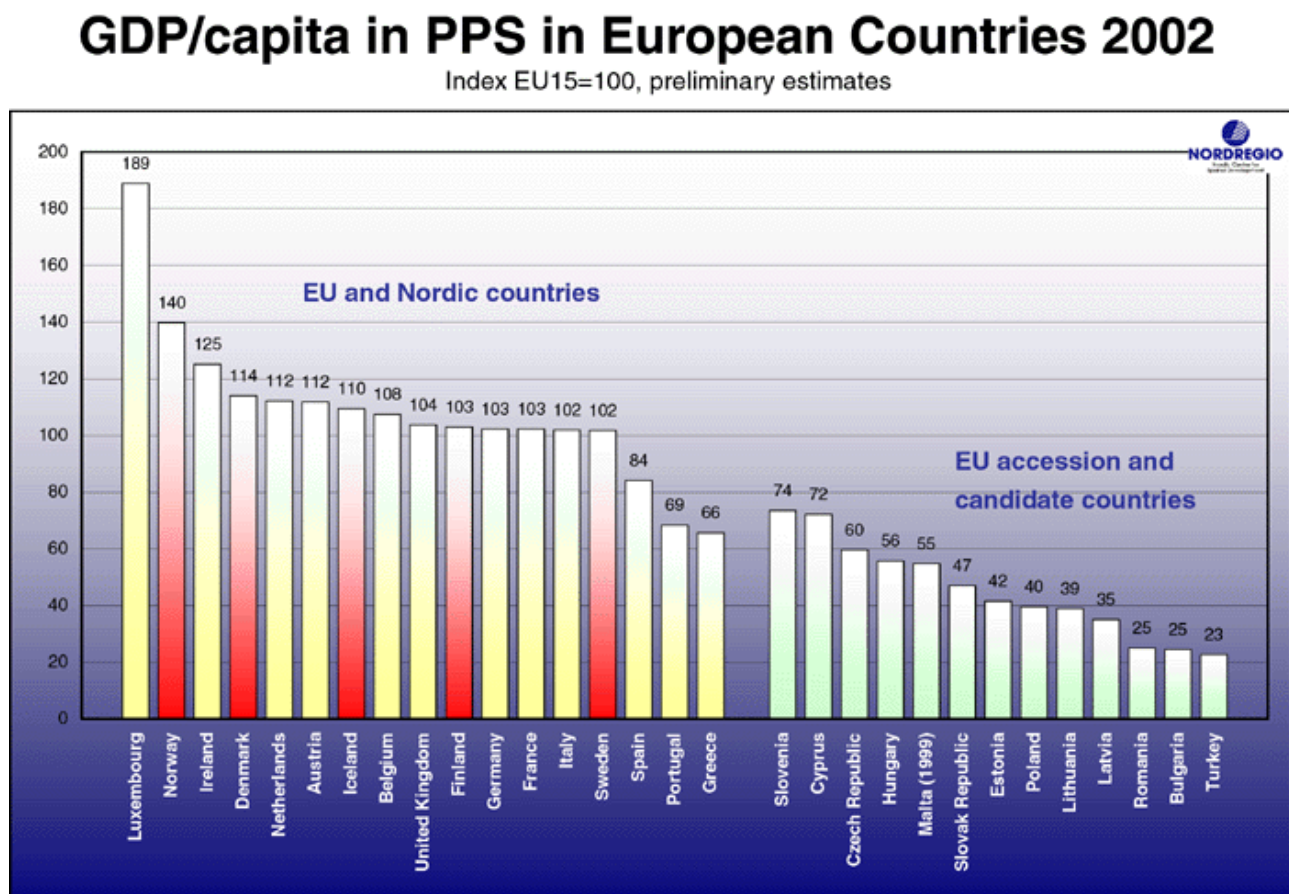
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<sup>7</sup>. Of particular interest are the so called Lisbon strategy of the EU to create the most competitive economy in Europe by 2010, and the Barcelona targets to spend 3 % of GDP on R&D in the EU.

## 2. Regional convergence in DK?<sup>8</sup>

In a European perspective regional differences have diminished during the last decades if we compare country wise, at least if we focus on the Western part of the EU. But also the new member countries are catching up, at least on the national averages. At the same time intra national disparities have been increasing in most countries, in Western Europe as well as in the new member states. The purpose of this section is provides a brief overview of regional convergence and disparities in a broader European perspective, and to compare with recent trends in Denmark, which usually not is done in comparative NUTS II level studies, due to the lack of NUTS II region in Denmark. Figure 3 and 4 below summarizes the major trends of the development in GDP per capita on a European level.

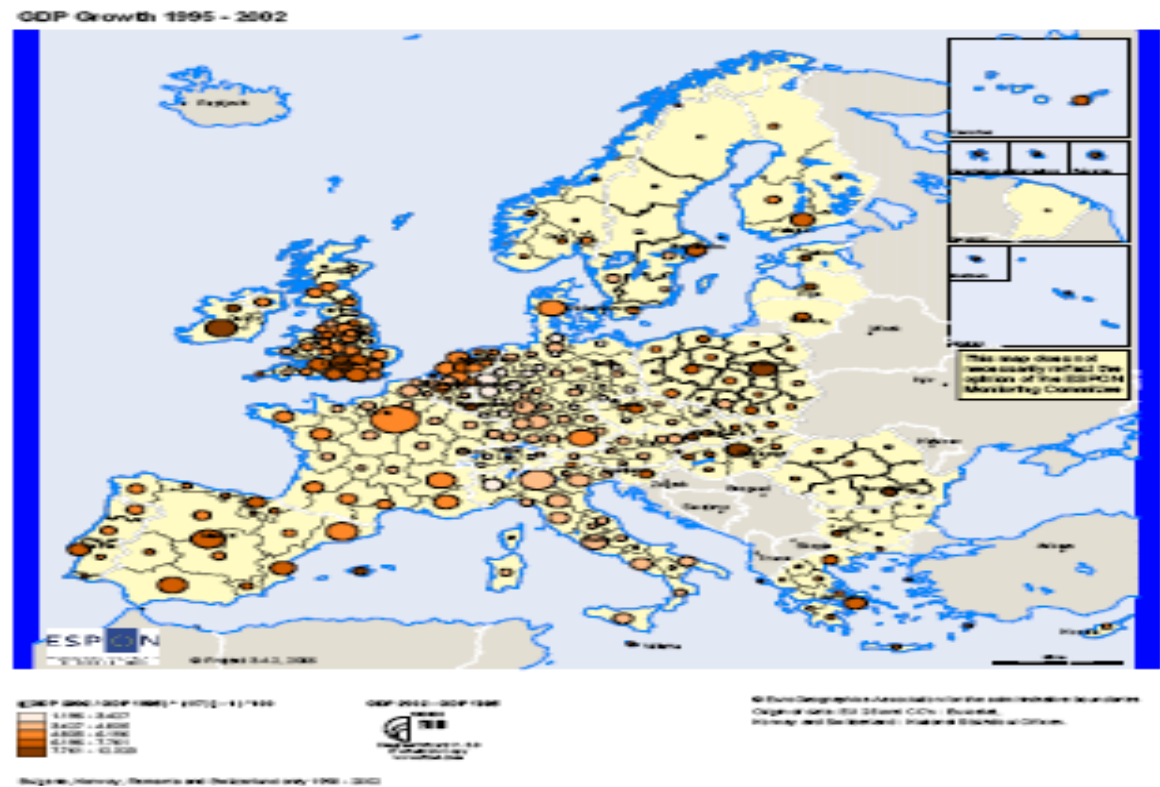
**Figure 3** GDP per capita in Europe 2002



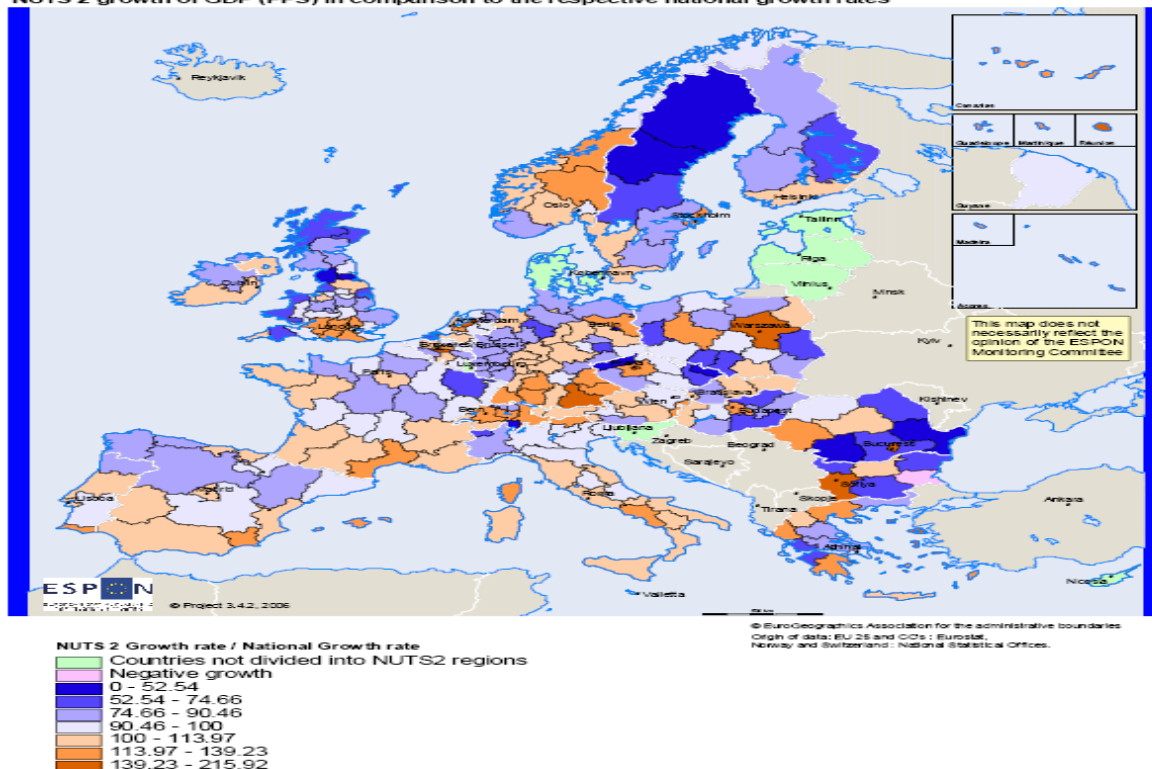
**Source:** Nordregio 2006

<sup>8</sup>. Due to time constraints and technical problems this section contains not the final analysis, but sketches only type of issues discussed.

Figure 4 Regional convergence in Europe



NUTS 2 growth of GDP (PPS) in comparison to the respective national growth rates



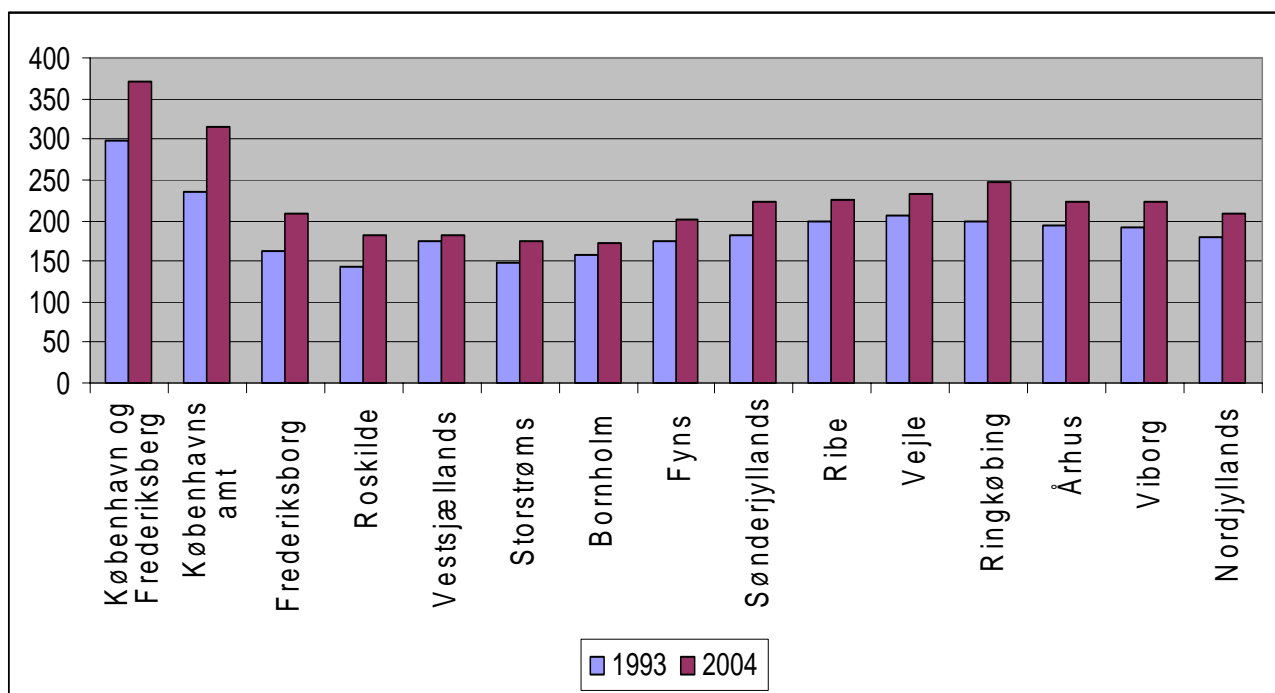
Source: ESPON 2006, pp.12 &13



The lower part of Figure 4 visualize the fact that economic growth within most countries has been very disperse, and in most cases have led to increased regional disparities within the countries, at least in a European perspective<sup>9</sup>.

Figure 5 illuminates the interregional development in Denmark since the early 1990's with regard to GDP per capita based on the Danish counties (NUTS III).

**Figure 5** GDP per capita in Danish counties 1993 and 2004 (2000 prices in 1000 DKK)



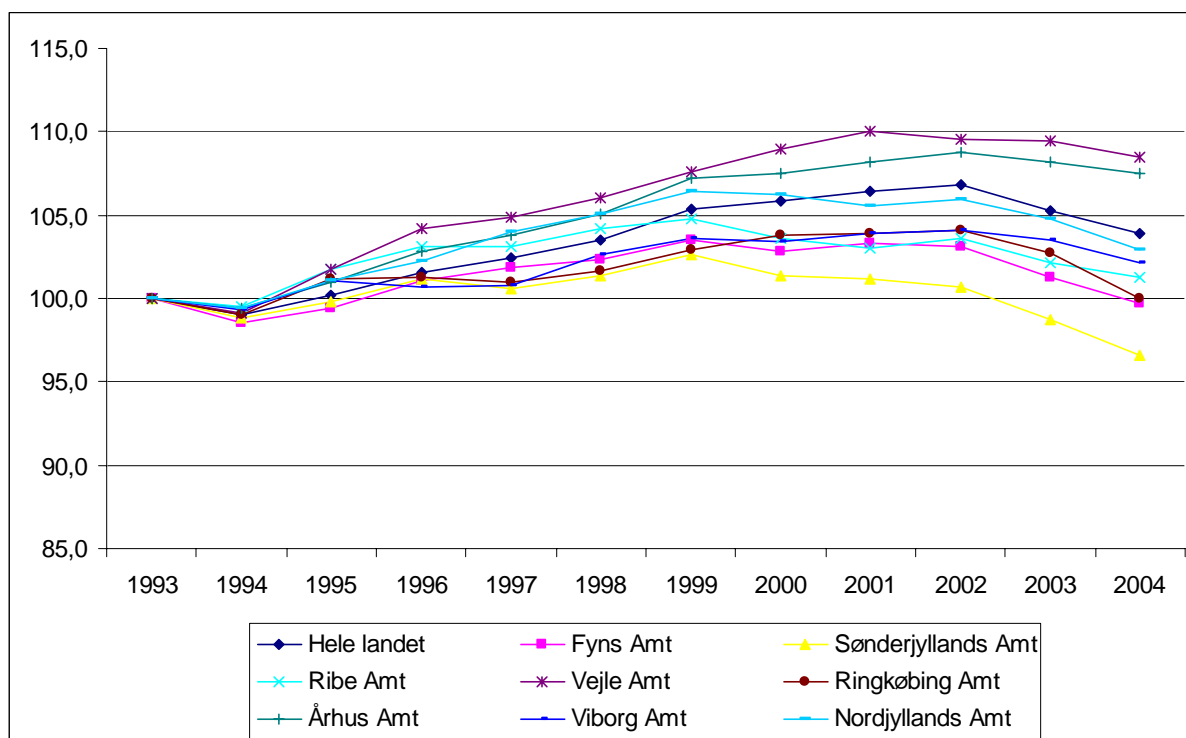
**Source:** Danmarks Statistik (2006).

Obviously the figure can not tell the whole through of the ongoing process of regional development. A first inspection of the data at least reveal three groups of counties, The metropolitan area of Copenhagen with the highest GDP per capita, a group around the national average covering the peninsula of Jutland and the remaining part of Denmark, the islands outside Metropolitan Copenhagen. Jutland as the 'industrial heartland' of Denmark today took advantage of export demand as well as the relative good standing of the Danish economy since the mid 1990's. In the longer run a considerable part of the Jutland will face new problems due to decline of the labour force (see Section 4) and probably also caused by los of industrial employment through outsourcing etc. Regarding the low growth area of the islands outside Copenhagen the increase of the

<sup>9</sup>. For an discussion of the principal aspects of this trend, both empirical and in a theoretical perspective see Cuadrado-Roura & Parellada ed. 2002.

Copenhagen labour market to cover all of Zealand has a negative impact on GDP per capita, but not if we used income per capita for residential areas. Generally the enlargement of commuting areas in Denmark (Ministry of the Environment 2006 pp. 30-35) indicates a centralization of economic activities in the country<sup>10</sup>. A closer look on the development of employment in Western Denmark confirms the picture of reinforced disparities. Only the most central parts of Jutland the counties of Vejle and Århus show figures above the national average, see Figure 6 below.

**Figure 6** Development of employment in Western Denmark since 1993.



**Source:** Danmarks Statistik (2005), Statistikbanken

<sup>10</sup>. Specific target regions for a regional growth strategy aiming to improve the situation of the most affected areas were already designated in 2003 (Ministry of Economics and Business 2003).

### **3. Innovation in Western DK<sup>11</sup>**

Innovation policy and support to the improvement and development of regionally founded systems of innovation has become an increasingly popular instrument not only of general business development policy, but also in particular in a regional perspective. One of the early elements in Danish policy initiatives is the improvement of the technological service system (Ministry of Science 2002).

The regional aspects of this policy has been highlighted by the decision to establish four new information technology cores in Western Denmark aiming to improve the spread of knowledge and technology between universities, research institutes and the business community in a regional context, and to constitute a supportive instrument to the promotion of business and competence clusters set up by the previous government.

With regard to the general approach to deal with regional disparities, the most important announcement was to introduce a 'regional assessment procedure' similar to the well-known environmental assessment procedures concerning the regional impacts of governmental policy (Ministry of the Interior and Health 2002, p. 102ff.). As stressed in the introduction, the transformation of new products and processes into commercial business are decisive for the effect of innovation as a driver for regional growth and development. According to the model presented in Section 1 the advisory system and consultants etc. are important actors in the process of implementation of innovation and knowledge into the firm and the business sector in general. The below reported results provides a first assessment of the success with regard to dissemination. The picture shown is rather mixed and no unequivocal result is obtained.

Nevertheless the questionnaire can shed some light on how the process of a knowledge and innovation-based business development policy can be implemented. Of particular importance is the communication of supportive initiatives to the relevant actors within the area or branch to stimulate the innovative capabilities. Core elements in the process are:

- Knowledge about the most appropriate way to analyze innovative activities in cooperation between different partners.
- The creation of knowledge about the way advisory systems work and improvements of instruments aiming the transformation of new knowledge about new processes and products.
- The importance of innovations for regional development in the short as well as the long run.
- Identification and development of new tools for regional business development policy.
- Identification of specific innovative strategies and key success factor.

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<sup>11</sup> This section is mainly based on Cornett & Sørensen 2005.

The probably largest problem is that most business development programs, national as well as international or regional are supply rather than demand driven. Table 1 provides an overview of the most important supply-side actors in Denmark, and their main functions and relations in the system of innovation with examples from Denmark. The results reported in the last part of this section indicate the need for further development of the linkages between the advisory and business service sector and the firm sector, in particular with regard to start-ups and companies acting as mavericks on the market.

**Table 1** Functions and units in a system of innovation (Danish examples)

	<b>Administration;</b> Policy & financial bodies)	<b>Implementation:</b> Tools & programs	<b>Knowledge institutions:</b> Research and graduate education
<b>Local/regional</b>	Regions (until 2007 counties) & municipalities	Previously TIC, now part of regional business service system	Universities and R&D institutes, University colleges
<b>National</b>	Ministries and Governmental agencies	GTS, (approved technology service institutes)  Technological Institutes Consultants	Universities and R&D institutes, University colleges
<b>Spatial/supranational</b>	EU  International Agencies	6 <sup>th</sup> & 7th framework program  The Northern Dimension Working Group on Innovation ( <a href="http://www.ndinno.net">www.ndinno.net</a> )	Universities and R&D institutes, University colleges

**Note:** Table 1 summarizes the most important types of supply side actors in the Danish system of innovation. TIC's are the regional technological information agencies constituting the most important contact points in particular for SMEs often also with regard to other issues than technological. Recently, they have been integrated in a broader organizational framework in many regions, i.e. The South Jutland Regional Business Development Centre, see [www.sjec.dk](http://www.sjec.dk), or 'iværkcenter' a cooperation of educational institutions, the county of Vejle and Centre for Small Business Studies at the University of Southern Denmark to facilitate start-up initiatives, see also Vejle amt (2006) [www.startguiden.dk/vejle/0/25/0](http://www.startguiden.dk/vejle/0/25/0) The regional scope of the former TIC system has been supplemented by a number of sectors or functional based advisory bodies, the so-called Approved Technological services institutes, GTS, placed at different locations in the country.

**Source:** Cornett 2006

Table two summarizes the major findings from the survey in Western Denmark with regard to companies' use of the advisory system in the innovative process, and to what extent they are involved in cooperative activities.

**Table 2** Public advisory and inter firm cooperation Western Denmark survey

<i>Did your company develop any new products and place these on the market within the last three years</i>			
<i>Did your company receive public advisory?</i>	Yes	No	Total
Yes	77	23	100
No	141	99	240
<b>Total</b>	<b>218</b>	<b>122</b>	<b>340</b>
<i>Did your company receive any public advisory?</i>			
<i>Did your company co-operate with any other firm in product development?</i>	Yes	No	Total
Yes	100	73	173
No	0	157	157
<b>Total</b>	<b>100</b>	<b>230</b>	<b>330</b>

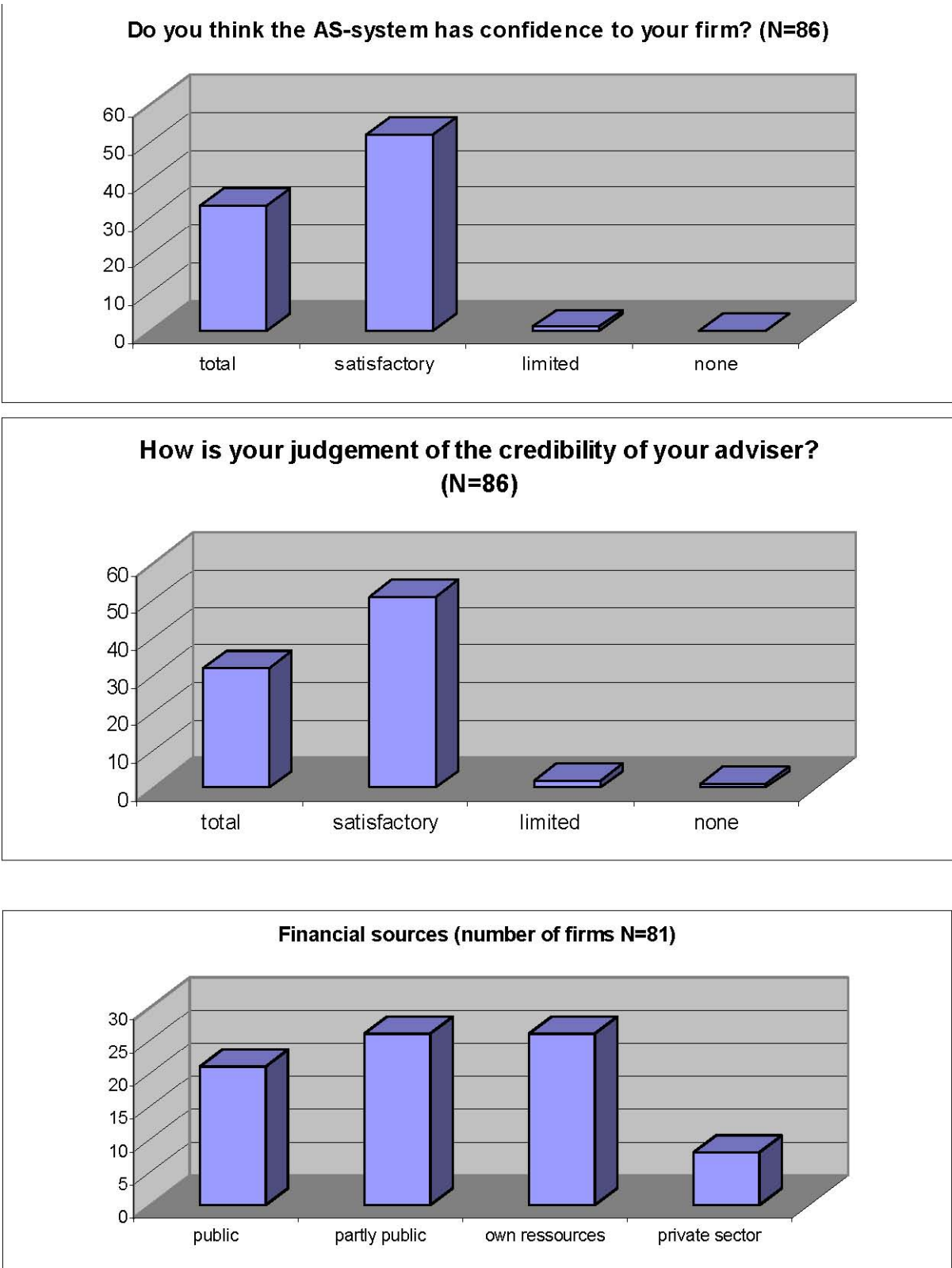
**Source:** SDU-Innovation project 2003, here quoted from Freytag et al. 2003.

By use of the material from the questionnaire it has been possible to dig at least a little deeper into the problems of innovation and the role of the supply-side organizations in the system of innovation, and to examine some of the theoretical issues outlined in the chapter. Unfortunately the validity of our results is affected by the low response rate of the questionnaire. Further, it has to be taken into account that at least one of the seven manufacturing sectors is clearly under-represented in the sample, and that the sample generally is over-represented with larger firms<sup>12</sup>.

Anyhow the figures presented in Figure 7 seem to indicate that most of the companies in touch with the advisory system are satisfied. The main problem from a business development point of view remains, that many firms only have a rudimentary knowledge about the system.

<sup>12</sup>. The most important survey details are reported in Cornett & Sørensen 2005, pp 480-84. Full documentation can be found in Freytag et al 2005.

**Figure 7** Firm assessment of the advisory system: Confidence, credibility and financial support



**Source:** SDU-Innovation project 2003, her quoted from Freytag et al 2003.

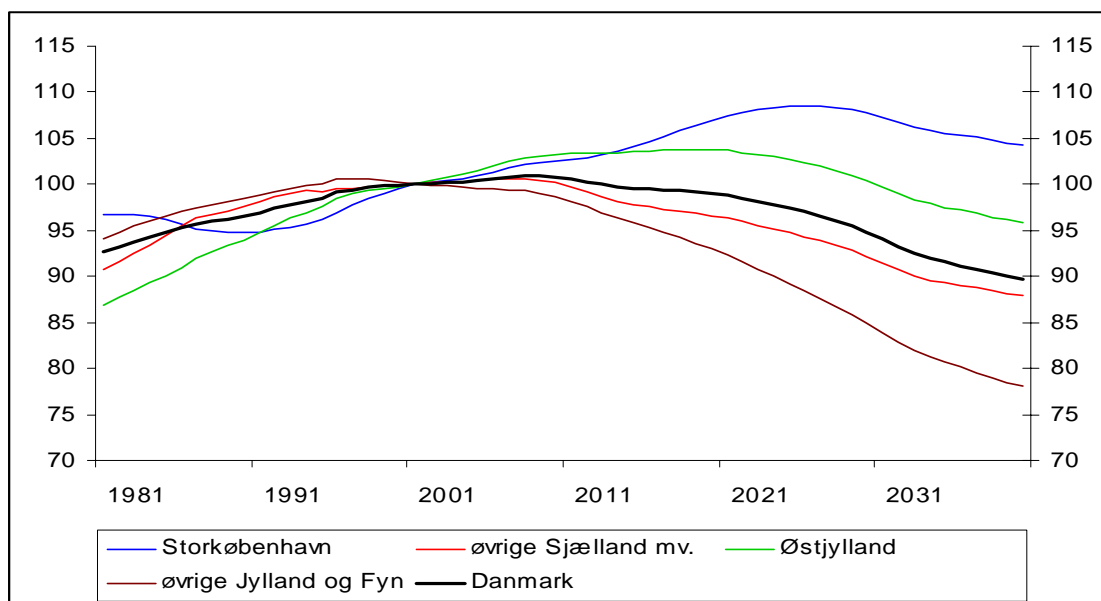
Among the factors of particular importance identified in the statistical analysis of the survey in Cornett and Sørensen (2005) are that developed technology and efficient business culture are influencing positively on innovation, whereas supply chains are influencing negatively. This may be due to the time horizon involved in changing a supply chain. This result is true both for an over-identified data set as well as for a reduced data set. Based on the latter data set the existence of joint ventures among firms significantly contributes to the success of an innovation whereas public support not is found to be significant. Further, factors like patents, high profit rate, and firm experience significantly contribute to the success of an innovative action. Finally, international orientation of the production with a high content of trade is found not to influence on innovation. With regard to the input of supply-side measures on the firms' innovative activity there still seems to be a mismatch between what the advisory system's offers and the needs of the firms.

#### **4. Summary and Perspectives**

The analysis and the review presented in the previous sections, shows that innovation not is a magic tool in regional growth and development policy, and that the problem of dissemination not only of new technology but also of the capabilities and the resources provided by the advisory system has to be elaborated further.

In Denmark it still is an open question whether the reform of the business service system (i.e. the incorporation of the former Technological Information Centres) will provide better results than previously. Furthermore the creation of the new regions with responsibility for regional business development, and the creation of the new 'Growth forums' has changed the regional landscape of regional policy. The forums will probably face the problem to be trapped in the middle between governmental initiatives and more proactive enlarged municipalities. One problem in this regard is the rather amount limited of financial resources available (100 DKK per inhabitant), which for an average region means approximately 13- 14 million Euro. Additional money will according to the blueprints only become available through specific programs or by voluntary contributions of the municipalities.

**Figure 8** Distribution of the age groups in the workforce (16 – 65 years of age) in different parts of Denmark



**Source:** Pedersen (2006)

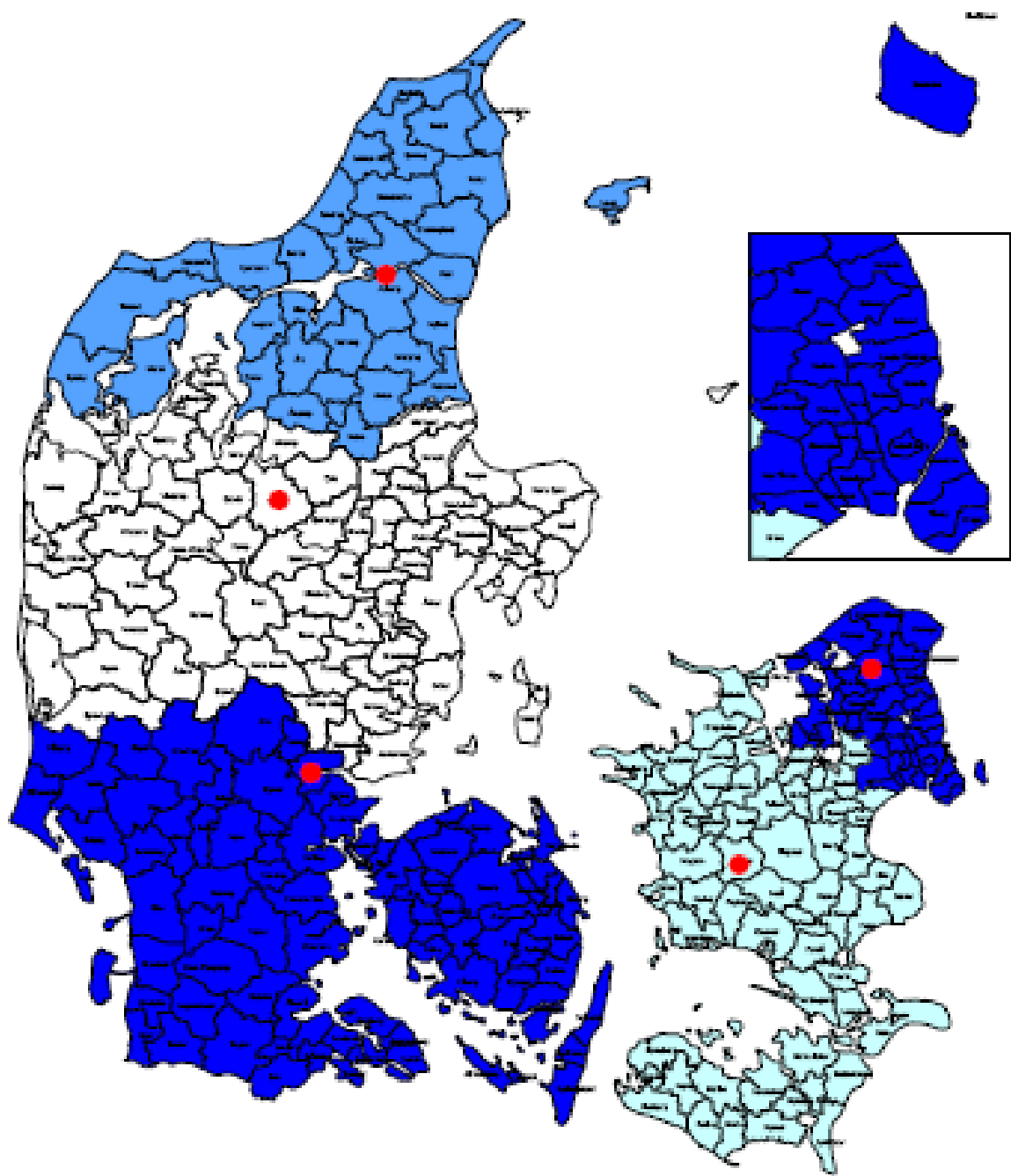
With regard to interregional disparities many of the new regions have to face these also as internal problems within their area. The probably largest challenge the new regions and the country as a whole have to face is changing demographic map of Denmark with a significant redistribution of population to the Metropolitan area of Copenhagen the Eastern part of Jutland, where the most innovative industries are located. In the long run the population will follow the best employment opportunities. The demographic consequences are summarized in Figure 8.



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Annex: The new regional division of Denmark from 2007.



Source: Ministry of the Interior and Health (2006)